REMARKS

Claims 1-8 remain present in this application.

Rejection under 35 USC 103

Claims 1-8 stand rejected under 35 USC 103 as being unpatentable over Lee et al., "Fast head modeling for animation," in view of Migdal et al., U.S. Patent 6,208,347. This rejection is respectfully traversed.

Amendments have been made to claims 1 and 5 to specify that the reconstructed 3D model is locked in the same position despite the number of sample numbers. It is respectfully submitted that this change should not contain any new matter.

Independent Claim 1

Lee teaches a method to make individual faces for animation from several possible inputs. Lee presents a method to reconstruct 3D facial model for animation from two orthogonal pictures taken from front and side views or from range data obtained from any available resources. This is based on extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points. Then, the fine modifications follow if range data is available. Automatic texture mapping is employed using a composed image from the two images. The reconstructed 3D-face can be animated immediately with given expression parameters. According to Lee, several faces by one methodology are applied to different input data to get a final, animatable face.

Independent claim 1 of the present application teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation. Original 3D model data is input. 3D feature-lines are built according to the original 3D model data. The 3D feature-lines

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are converted into 3D threads having respective pluralities of connection joints, connection lines, and loops. Sample numbers of each connection line are determined, the loops are added or deleted, and the 3D threads are output. A regular triangular grid sample model is produced according to the 3D threads. The regular triangular grid sample model is projected into the original 3D model to produce a reconstructed 3D model. Sample numbers for each connection line are re-determined, the loops are re-added or re-deleted, and steps (e) and (f) are repeated if the reconstructed 3D model does not satisfy resolution requirements, and the reconstructed 3D model is output if the reconstructed 3D model satisfies the resolution requirements.

The patent to Lee provides a 3D generic model with animation structure in and 2D frames used for the normalization and the feature detection (section 2.1). Lee applies feature detection from 2D image data (orthogonal picture images or texture image for range data), and then modifies the given generic model for a rough matching. The generic model is utilized in normalization and feature detection for different feature detection subjects. In addition, before the matching procedure, the given generic model is distinct from the feature detection subject.

In claim 1 of the present application, on the contrary, the 3D feature-lines, 3D threads, and the reconstructed 3D model all reside in the same grid model surface. In addition, for each given range data, a reconstructed 3D model is determined according to features and structures of the given range data. In other words, the reconstructed 3D model is designed distinctively for each given data. There is no "generic model" in the present invention.

Lee does not teach or suggest the reconstruction of a regular 3D model from an original 3D model, as is set forth in independent claim 1 of the present application. The method of Lee is therefore completely different from the method of the present application.

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Midgal teaches a system and method for modeling 3D objects and 2D images by wireframe mesh constructions having data points that combine both spatial data and surface information such as color or texture data. The use of the complex data points (e.g., X, Y, Z, R, G, B in 3D and x, y, R, G, B in 2D) allows the modeling system to incorporate both the spatial features of the object or image as well as its color or other surface features into the wireframe mesh. The 3D object models taught by Midgal do not require a separate texture map file for generating display or other object manipulations. In an exemplary embodiment, the mesh constructions taught by Midgal contain sufficient color information such that the triangles of the meshes can be rendered by any processor supporting linear or bilinear interpolation such as Gouraud shading. For 2D systems, the 2D mesh models created from the teachings of Midgal replace bitmap files and present a greater level of data compression and flexibility in image manipulation than is currently available in compression systems such as JPEG. In addition, the modeling system taught by Midgal has dynamic resolution capability, such that surface details like color or texture can be rapidly added or subtracted from the model.

Midgal provides a system and method for modeling 3D objects and 2D images by wireframe mesh constructions having data points that combine both spatial data and surface information such as color or texture data. The mesh construction taught by Midgal has nothing to do with feature lines.

In claim 1 of the present application, on the contrary, the reconstruction of a regular 3D model is built from feature-lines in an original 3D model. In addition, the reconstructed 3D model is locked in the same position despite of resolution changes. This feature is very important, for various applications utilize position information of the reconstructed 3D model for

further editing and/or setting control points. Midgal does not teach or suggest a locked-position reconstructed 3D model, and does not provide the described benefits of the present invention.

Midgal therefore does not teach or suggest the reconstruction of a regular 3D model from an original 3D model, as is set forth in claim 1 of the present application. The method of Midgal is therefore completely different from the method of claim 1.

To enhance the Examiner's understanding of t he invention, Appendix A is attached hereto, which provides color version of original Figs 2-7B of the present application. Using these color pictures, the feature lines segmentation can be recognized more easily.

Using Figs. 6A and 7A as examples, users can enhance partial resolution of the reconstructed model through an interface to meet requirements. Figs. 7A and 7B are reconstructed 3D models with partially enhanced resolution according to the invention. The feature lines (presented as blue lines in the attached Appendix A) of Figs. 6A and 7A are the same, while sample numbers (presented as nodes on the blue lines in the attached Appendix A) are increased in the feature lines of Fig. 7A. A reconstructed 3D model is constructed based on nodes based on the re-determined sample number. The invention provides a method of adjusting resolution of the reconstructed 3D model without changing the original feature lines. This technical feature facilitates further applications, such as 3D animation, and has not been taught by the prior art utilized by the Examiner.

Accordingly, the teachings of claim 1 cannot be anticipated by the cited references, and the rejections of claim 1 should be withdrawn.

In view of the foregoing amendments and remarks, it is respectfully submitted that the prior art utilized by the Examiner fails to teach or suggest the method of independent claim 1 of the present application, as well as its dependent claims.

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Independent Claim 5

Lee teaches a method to make individual faces for animation from several possible inputs. Lee presents a method to reconstruct 3D facial model for animation from two orthogonal pictures taken from front and side views or from range data obtained from any available resources. This is based on extracting features on a face in a semiautomatic way and modifying a generic model with detected feature points. Then the fine modifications follow if range data is available. Automatic texture mapping is employed using a composed image from the two images. The reconstructed 3D-face can be animated immediately with given expression parameters. According to Lee, several faces by one methodology are applied to different input data to get a final animatable face.

Independent claim 5 teaches a computer-implemented method of reconstructing a regular 3D model by feature-line segmentation. Original 3D model data is input. 3D feature-lines are built according to the original 3D model data. The 3D feature-lines are converted into 3D threads having respective pluralities of connection joints, connection lines, and loops. Sample numbers of each connection line are determined, the loops are added or deleted, and the 3D threads are output. A regular triangular grid sample model is produced according to the 3D threads. The regular triangular grid sample model is projected into the original 3D model to produce a reconstructed 3D model. Sample numbers for each connection line are re-determined, the loops are re-added or re-deleted, and steps (e) and (f) are repeated if the reconstructed 3D model does not satisfy resolution requirements, and the reconstructed 3D model is output if the reconstructed 3D model satisfies the resolution requirements.

Lee provides a 3D generic model with animation structure in and 2D frames used for the normalization and the feature detection (section 2.1). Lee applies feature detection from 2D

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image data (orthogonal picture images or texture image for range data), and then modify the given generic model for a rough matching. The generic model is utilized in normalization and feature detection for different feature detection subjects. In addition, before the matching procedure, the given generic model is distinct from the feature detection subject.

In claim 5, on the contrary, the 3D feature-lines, 3D threads, and reconstructed 3D model all reside in the same grid model surface. In addition, for each given range data, a reconstructed 3D model is determined according to features and structures of the given range data. In other words, the reconstructed 3D model is designed distinctively for each given data. There is no "generic model" according to the claimed invention.

Lee does not teach or suggest the reconstruction of a regular 3D model from an original 3D model, as is recited in independent claim 5.

Midgal teaches a system and method for modeling 3D objects and 2D images by wireframe mesh constructions having data points that combine both spatial data and surface information such as color or texture data. The use of the complex data points (e.g., X, Y, Z, R, G, B in 3D and x, y, R, G, B in 2D) allows the modeling system to incorporate both the spatial features of the object or image as well as its color or other surface features into the wireframe mesh. The 3D object models taught by Midgal do not require a separate texture map file for generating display or other object manipulations. In an exemplary embodiment, the mesh constructions taught by Midgal contain sufficient color information such that the triangles of the meshes can be rendered by any processor supporting linear or bilinear interpolation such as Gouraud shading. For 2D systems, the 2D mesh models created from the teachings of Midgal replace bitmap files and present a greater level of data compression and flexibility in image manipulation than is currently available in compression systems such as JPEG. In addition, the

modeling system taught by Midgal has dynamic resolution capability, such that surface details like color or texture can be rapidly added or subtracted from the model.

Midgal provides a system and method for modeling 3D objects and 2D images by wireframe mesh constructions having data points that combine both spatial data and surface information such as color or texture data. The mesh construction taught by Midgal has nothing to do with feature lines.

In claim 5 of the present application, on the contrary, the reconstruction of a regular 3D model is built from feature-lines in an original 3D model. In addition, the reconstructed 3D model is locked in the same position despite of resolution changes. This feature is very important, for various applications utilize position information of the reconstructed 3D model for further editing and/or setting control points. Midgal does not teach or suggest a locked-position reconstructed 3D model, and does not provide the described benefits of the claimed invention.

Midgal does not teach or suggest the reconstruction of a regular 3D model from an original 3D model, as is recited in independent claim 5 of the present application. The method taught by Lee is therefore completely different from that of claim 5 of the present application.

To enhance the Examiner's understanding of the invention, reference is again made to Appendix A attached hereto, which provides color version of original Figs 2-7B of the present application. Using these color pictures, the feature lines segmentation can be recognized more easily.

Using Figs. 6A and 7A as examples, users can enhance partial resolution of the reconstructed model through an interface to meet requirements. Figs. 7A and 7B are reconstructed 3D models with partially enhanced resolution according to the invention. The feature lines (presented as blue lines in the attached Appendix A) of Figs. 6A and 7A are the

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same, while sample numbers (presented as nodes on the blue lines in the attached Appendix A) are increased in the feature lines of Fig. 7A. A reconstructed 3D model is constructed based on nodes based on the re-determined sample number. The invention provides a method of adjusting resolution of the reconstructed 3D model without changing the original feature lines. The technical feature facilitates further applications, such as 3D animation, and has not been taught by cited references.

In view of the foregoing amendments and remarks, it is respectfully submitted that the prior art utilized by the Examiner fails to teach or suggest the method of independent claim 1 of the present application, as well as its dependent claims.

Summary

In view of the foregoing amendments and remarks, it is respectfully submitted that the prior art utilized by the Examiner fails to teach or suggest the method of independent claims 1 and 5, as well as their dependent claims. Reconsideration and withdrawal of the 35 USC 1103 rejection are respectfully requested.
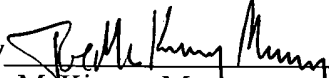
Conclusion

Favorable reconsideration and an early Notice of Allowance are earnestly solicited.

In the event that any outstanding matters remain in this application, the Examiner is invited to contact the undersigned at (703) 205-8000 in the Washington, D.C. area.

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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies,

to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional

fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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